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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,803	03/25/2004	Winthrop D. Childers	200314139	6014

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EXAMINER	
NOGUEROLA, ALEXANDER STEPHAN	
ART UNIT	PAPER NUMBER
1795	
MAIL DATE	DELIVERY MODE
10/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)	
Office Action Summary	10/808,803	CHILDERS ET AL.	
	Examiner	**Art Unit**	
	ALEX NOGUEROLA	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20,22,24,26 and 27* is/are rejected.

7)☒ Claim(s) *21 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/20/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☒ Other: *See Continuation Sheet*.

Continuation of Attachment(s) 6). Other: IDS of 8/02/04 and IDS of 3/25/2004.

DETAILED ACTION

Specification

1. Missing application serial numbers, such as on page 1 of the specification, must be provided.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-20, 22-24, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talary et al. US 7,169,282 B2 ("Talary") in view of Quake et al. US 6,964,736 B2 ("Quake").

Addressing claim 1, Talary discloses devices for filtering fluids using dielectrophoresis. One embodiment comprises

separating, within a cell sorter, a first portion of the cells from a second portion of the cells by applying a first non-uniform electric field via a first electrode array to cause movement of the first portion of the cells in a second direction across the fluid flow path, having a component generally transverse to the first direction into the output of a respective cell sorter (col. 15:04-24);

wherein separating the first portion of the cells from the second portion of the cells further includes at least one of:

interposing the fluid flow path in each cell sorter between the first electrode array and a second electrode array, and applying a second temporally varying non-uniform

electric field from the second electrode array to cause transport of the cells along the fluid flow path in the first direction (Figure 7B and col. 15:04-24); and

applying the first non-uniform electric field as a plurality of discrete non-uniform electric fields successively applied at different positions along the fluid flow path (implied by col. 15:12-21, which discloses applying traveling wave signals to each array).

Talary also discloses providing a fluid flow path for cell movement through a series of cell sorters in a first direction with an output of a preceding cell sorter of the series communicating with an input of a successive cell sorter of the series (col. 15:34-54). However, in these embodiments at least one of the electrode arrays is used to trap certain particles, rather than move or transport them in a desired direction so that the cell sorters act as filters.

Quake discloses a method of sorting cells comprising:

providing a fluid flow path for cell movement through a series of cell sorters in a first direction with an output of a preceding cell sorter of the series communicating with an input of a successive cell sorter of the series (Figures 1 and 7; col. 06:16-18 and col. 15:32-40); and

separating, within each cell sorter, a first portion of the cells from a second portion of the cells (col. 15:36-40).

In Quake the series of cell sorters are configured so that desired portions of the sample portions will flow into one or another successive channel branch and cascade through a series of cell sorters (col. 19:16-30).

It would have been obvious to one with ordinary skill in the art at the time of the invention to configure the cell sorters as taught by Quake so that sample portions will flow into one or another successive channel branch and cascade through a series of cell sorters in the invention of Talary because (1) Talary does, as already discussed, disclose providing cell sorters in series, although with one electrode array acting as a filter, (2) Talary, also discloses a cell sorter arranged so that each electrode array uses a non-uniform field to move or transport particles in perpendicular or other non-parallel directions to "... shepherd particles to specific locations of the substrate, e.g., adjacent particular outlet channels in the chamber" (col. 15:04-24), and (3) because Quake discloses that with the cell sorters arranged for cascading flow of different sample portions pools of cells can be collected at the outlets of the different branch channels (col. 19:14-31) so the different sample portions can be collected in parallel. In the series arrange of cell sorters in Talary the different sample portions will have to be successively flushed the filters in which they are trapped.

Talary as modified by Quake does not mention applying the first non-uniform electric field as a temporally varying non-uniform electric field at a different frequency in at least two cell sorters of the series; however, barring a contrary showing this is just a matter of optimizing each cell sorter for different types of particles. As taught by Quake, "In general, the amplitude and frequency of the applied voltage depends on the electrode geometry and type of target particle and fluid being filtered" and "The frequency of the AC waveform is usually selected to provide a desired DEP response in a target particle." See col. 05:63 – col. 06:12.

Addressing claims 2, 3, 13, and 14, the designation of a portion of the cells as target cells or non-target cells is essentially arbitrary. In Talary as modified by Quake the cells are successively separated into different portions until they appear as pools to be collected at the branch outlets. Whether some of the portions of the cells are later discarded will just depend on which cells are of interest. Also see col. 08:05-20, which discloses designating some particles as target particles or non-target particles.

Addressing claims 4, 5, and 8, as discussed in the rejection of claim 1, Talary teaches having the electrical field of each array configured, in part, by choice of frequency, to move or transport different particles in different directions, for example, to direct different particles to different cell sorter outlets. See col. 05:63 – col. 06:12 and col. 15:04-24. So the particular frequency used within a cell sorter by each electrode array as compared to the other electrode array or as compared to the electrode arrays in another cell sorter is just a matter of setting the electrical field parameters so that the sample components will be appropriately separate in a cell sorted and directed to the correct subsequent cell sorter for further separation.

Addressing claim 6, for the additional limitations of this claim see Figures 7A and 7B in Talary.

Addressing claim 7, for the additional limitations of this claim note that Talary states, "In operation, by applying appropriate traveling wave signals to each array, the system can apply a dielectrophoretic force in two non-parallel directions." See col. 15:12-14.

Addressing claim 9, for the additional limitations of this claim see in Talary col. 15:04-24.

Addressing claim 10, the additional limitations of this claim is obvious over col. 15:21-24 in Talary, which discloses shepherding particles to particular outlet channels in the chamber.

Addressing claims 11 and 27, Talary discloses a cell sorter system for a biodevice comprising:

an electrode array configured to apply a temporally varying electric field to the cells to move the cells in a second direction having a component generally transverse to the first direction to cause separation of a first portion of the cells into a first port and a second portion of the cells into a second port. See col. 15:04-24 and col. 16:12-29.

Talary also discloses providing a fluid flow path for cell movement through a

series of cell sorters in a first direction with an output of a preceding cell sorter of the series communicating with an input of a successive cell sorter of the series (col. 15:34-54). However, in these embodiments at least one of the electrode arrays is used to trap certain particles, rather than move or transport them in a desired direction so that the cell sorters act as filters.

Quake discloses a method of sorting cells comprising:

providing a fluid flow path for cell movement through a series of cell sorters in a first direction with an output of a preceding cell sorter of the series communicating with an input of a successive cell sorter of the series (Figures 1 and 7; col. 06:16-18 and col. 15:32-40); and

separating, within each cell sorter, a first portion of the cells from a second portion of the cells (col. 15:36-40).

In Quake the series of cell sorters are configured so that desired portions of the sample portions will flow into one or another successive channel branch and cascade through a series of cell sorters (col. 19:16-30).

It would have been obvious to one with ordinary skill in the art at the time of the invention to configure the cell sorters as taught by Quake so that sample portions will flow into one or another successive channel branch and cascade through a series of cell sorters in the invention of Talary because (1) Talary does, as already discussed, disclose providing cell sorters in series, although with one electrode array acting as a filter, (2) Talary, also discloses a cell sorter arranged so that each electrode array uses a non-uniform field to move or transport particles in perpendicular or other non-parallel

directions to "... shepherd particles to specific locations of the substrate, e.g., adjacent particular outlet channels in the chamber" (col. 15:04-24), and (3) because Quake discloses that with the cell sorters arranged for cascading flow of different sample portions pools of cells can be collected at the outlets of the different branch channels (col. 19:14-31) so the different sample portions can be collected in parallel. In the series arrange of cell sorters in Talary the different sample portions will have to be successively flushed the filters in which they are trapped.

Talary does not mention having the electrode arrays within at least two cell sorters in the series are configured for operation at different frequencies and the first port of a preceding cell sorter in the series is in communication with an input of a subsequent cell sorter in the series. However, Talary teaches having the electrical field of each array configured, in part, by choice of frequency, to move or transport different particles in different directions, for example, to direct different particles to different cell sorter outlets. See col. 05:63 – col. 06:12 and col. 15:04-24. Thus, it would have been obvious to one with ordinary skill in the art at the time of the invention to have the electrode arrays within at least two cell sorters in the series be configured for operation at different frequencies and the first port of a preceding cell sorter in the series is in communication with an input of a subsequent cell sorter in the series so that the sample

can be more finely separated into portions having more similar types of similar sample components.

Addressing claim 15, as discussed in the rejection of claim 11, Talary teaches having the electrical field of each array configured, in part, by choice of frequency, to move or transport different particles in different directions, for example, to direct different particles to different cell sorter outlets. See col. 05:63 – col. 06:12 and col. 15:04-24. So the particular frequency used within a cell sorter by each electrode array as compared to the other electrode array or as compared to the electrode arrays in another cell sorter is just a matter of setting the electrical field parameters so that the sample components will be appropriately separate in a cell sorted and directed to the correct subsequent cell sorter for further separation. The ability to produce different frequency for each different electrical field would necessarily requires a signal generator configured as required by claim 15. Such a signal generator, in fact, appears to be disclosed by Talary as signal generator 140 in Figure 8A generates signals for the electrode arrays of the cell sorters so that the same or different cells can be separated by each cell sorter. See col. 15:34-45 and col. 05:55 – col. 06:12.

Addressing claim 16, for the additional limitations of this claim see in Quake Figure 7.

Addressing claims 17 and 22, Talary discloses a cell sorter system for a biodevice comprising:

a fluid flow path configured for directing a flow of cells in a first direction; an electrode arrangement including a first electrode array and a second electrode array with the first electrode array configured to apply a first temporally varying non-uniform electric field for causing movement of a field- responsive portion of the cells in a second direction having a component generally transverse to the first direction and the second electrode array configured to apply a second temporally varying non-uniform electric field for causing transport of the cells along the fluid flow path in the first direction.

Talary also discloses providing a fluid flow path for cell movement through a series of cell sorters in a first direction with an output of a preceding cell sorter of the series communicating with an input of a successive cell sorter of the series (col. 15:34-54). However, in these embodiments at least one of the electrode arrays is used to trap certain particles, rather than move or transport them in a desired direction so that the cell sorters act as filters.

Quake discloses a method of sorting cells comprising: providing a fluid flow path for cell movement through a series of cell

sorters in a first direction with an output of a preceding cell sorter of the series communicating with an input of a successive cell sorter of the series (Figures 1 and 7; col. 06:16-18 and col. 15:32-40); and

separating, within each cell sorter, a first portion of the cells from a second portion of the cells (col. 15:36-40).

In Quake the series of cell sorters are configured so that desired portions of the sample portions will flow into one or another successive channel branch and cascade through a series of cell sorters (col. 19:16-30).

It would have been obvious to one with ordinary skill in the art at the time of the invention to configure the cell sorters as taught by Quake so that sample portions will flow into one or another successive channel branch and cascade through a series of cell sorters in the invention of Talary because (1) Talary does, as already discussed, disclose providing cell sorters in series, although with one electrode array acting as a filter, (2) Talary, also discloses a cell sorter arranged so that each electrode array uses a non-uniform field to move or transport particles in perpendicular or other non-parallel directions to "... shepherd particles to specific locations of the substrate, e.g., adjacent particular outlet channels in the chamber" (col. 15:04-24), and (3) because Quake discloses that with the cell sorters arranged for cascading flow of different sample portions pools of cells can be collected at the outlets of the different branch channels

(col. 19:14-31) so the different sample portions can be collected in parallel. In the series arrange of cell sorters in Talary the different sample portions will have to be successively flushed the filters in which they are trapped.

As for a cell diverter disposed within the fluid flow pathway to encourage separation of the field-responsive portion of the cells from a non-responsive portion of the cells, such a cell diverter would be present in the invention of Talary as modified by Quake. See Figure 7 in Quake.

Addressing claim 18, for the additional limitations of this claim see Figures 7A and 7B in Talary and Figure 7 in Quake. The electrode arrangements in Talary would be located adjacent the diverters in the Figure 7 of Quake.

Addressing claim 19, for the additional limitations of this claim see Figures 7A and 7B in Talary.

Addressing claims 20, 23, and 26, for the additional limitations of this claim see Figures 7A and 7B and col. 15:12-24 in Talary.

Addressing claim 24, for the additional limitations of this claim see Figure 7A in Talary, which shows the electrodes 910 extend further along the width of the flow channel than do electrodes 920 and that electrodes 920 extend further along the length of the flow channel than do electrodes 910.

Allowable Subject Matter

6. Claims 21 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:

a) Claim 21: the combination of limitations the second electrode array to extend from a main portion of the fluid flow path into and through a first port of the fluid flow path, and into and through a second port of the fluid flow path. In Talary as modified by Quake the electrode arrays for each cell sorter would be in the channel portion before the diverter and so not extend through a port into a branching fluid path.

b) Claim 25: the combination of limitations requires each electrode element to have a generally sharpened end from which the electric field is applied. "The sharp tip of each element 176 enables application of a high field region to exert a highly focused electric field to significantly impact cells with movement in the second direction. " See page 14, lines 05-07 of the specification.

In Talary as modified by Quake each electrode element has a flat end. See Figures 7A and 7B in Talary.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (571) 272-1343. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NAM NGUYEN can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alex Nogueroła
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AU 1753
September 29, 2007